National Oceanic and Atmospheric Administration

Strategic Information Technology Plan

Enterprise Architecture

2005-2010

NOAA Strategic Information Technology Plan

Enterprise Architecture

Planning Programming Budgeting, and Execution System (PPBES)

The Planning, Programming, Budgeting, and Execution System (PPBES) is the process that the National Oceanic and Atmospheric Administration (NOAA) uses to link NOAA's strategic vision with programmatic detail, budget development, , operating activities and information technology. The PPBES meets the Office of Management and Budget's requirements for a "comprehensive system that integrates analysis, planning, evaluation and budgeting." A major decision-making process, the PPBES permits the NOAA Undersecretary and Executive Committee to establish strategic directions, specific requirements, corporate performance measures and strategic targets for NOAA's missions.

As Figure 1 below illustrates, the PPBES process is an inclusive process that ties planning, programming, budgeting, and execution together to ensure activities the agency undertakes are effective in meeting NOAA's mission and vision.

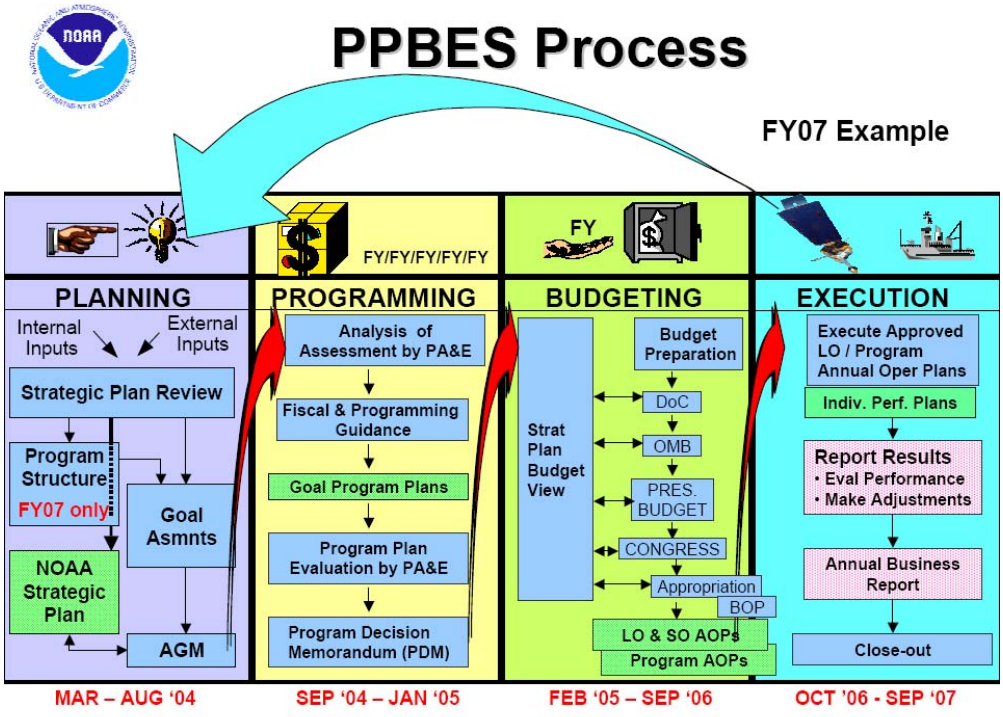

Figure 1 - PPBES Overview

Annually, PPBES has the following objectives:

- Organize and align NOAA's resources toward achieving Strategic Plan outcomes
- Assess progress in meeting Strategic Plan outcomes
- Prioritize resources among competing requirements
- Select the best alternative program plan to meet Strategic Plan outcomes
- Focus budgeting and accountability on expenditure details (inputs) and on the results (outputs and impact) from the expenditures
- Manage the cost, schedule, and performance of programs
- Adjust resource requirements based on execution performance

There are four major interrelated phases in the PPBES process. These are:

- Planning
- Programming
- Budgeting
- Execution.

Each phase will be addressed individually in the following sections.

Planning

The Planning phase identifies the capabilities and capacities required to deliver products and services to NOAA constituents. It defines NOAA's goals, strategy, and guidance for the upcoming programming phase regarding resources and requirements to meet objectives. The Planning phase begins three years in advance of the fiscal year in which budget authority will be requested. Figure 2 depicts the Planning phase.

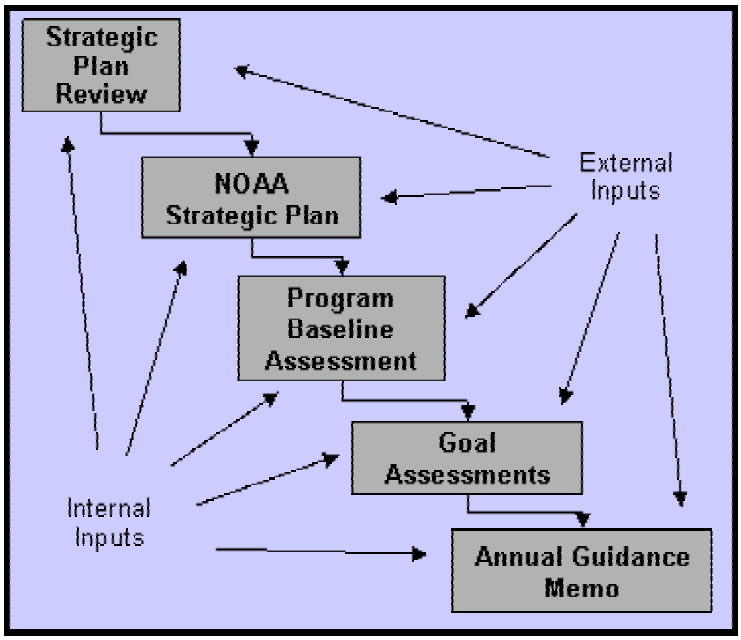

Figure 2 Planning Phase

Programming

The Programming phase aligns available resources against validated and prioritized requirements. The Programming process allows executive leaders to look across NOAA and apply effort and resources in areas where there is the greatest potential return on investment. Programming provides the programmatic and fiscal basis for the NOAA budget. Figure 3 provides an overview of the major steps within the Programming phase.

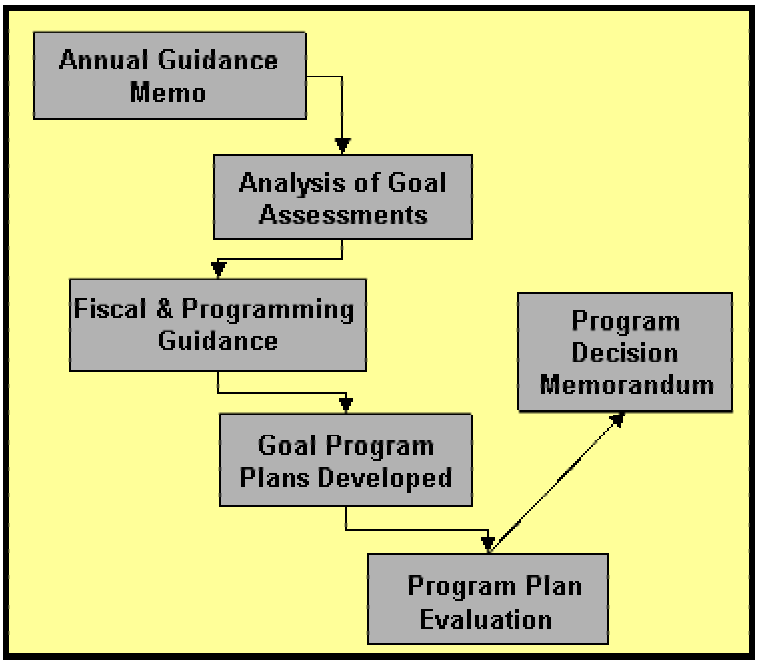

Figure 3 Programming Phase

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Budgeting

The budgeting phase determines final resource requirements to meet program commitments, to further develop and justify these requirements, and to determine the impact of revised resource levels and executability of programs at the approved funding level. The financial requirements of the program plans as cited in the Undersecretary's Program Decision Memorandum (PDM) are examined and recommendations made, including possible adjustments to the program decisions. At the is phase the NOAA Information Technology Review Board (NITRB) acts as an advisory board for NOAA management on critical IT matters. The NITRB ensures that proposed investments contribute to NOAA's strategic vision and mission, employ sound IT investment methodologies, comply with NOAA system architectures, and provide the highest return on investment with acceptable project risk. In this phase the formal technical budget is prepared and submitted to the Department of Commerce.

Execution

The Execution phase is the management of the cost, schedule, and performance of programs. Adjustments to resource requirements are based on execution performance. Figure 4 is a detailed overview of the PPBES process.

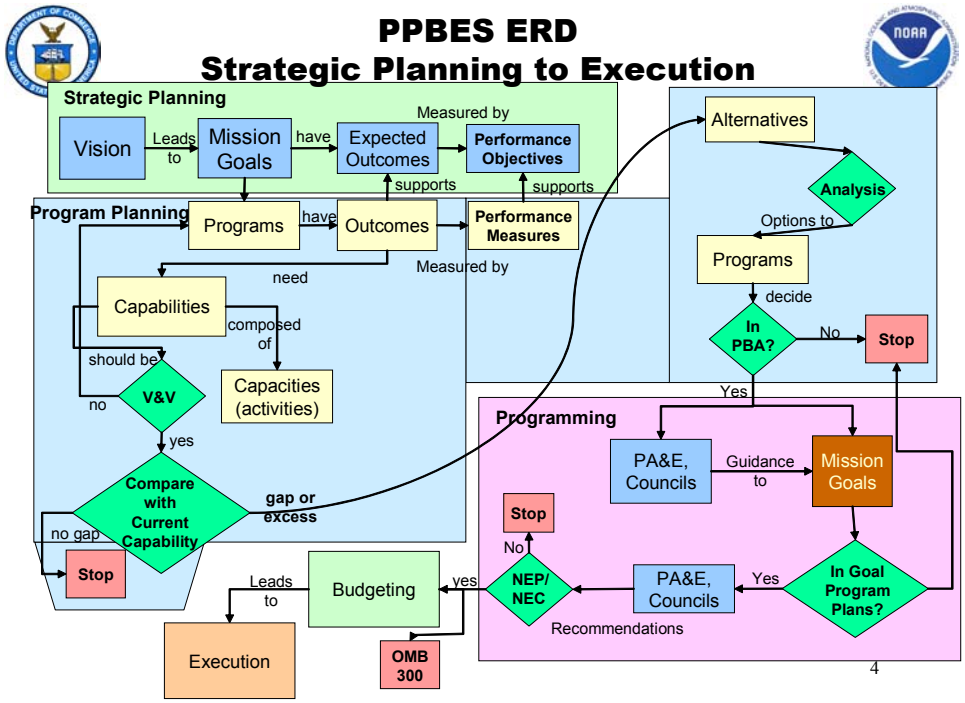

Figure 4 PPBES from Strategic Planning to Execution

NOAA's Mission Goals and Programs Structure

Based on stakeholder input and internal assessments of our mandates and mission, NOAA has adopted a structure of four Mission Goals and a Critical Mission Support Goal around which all of our work is planned and organized. The Mission Goals align with the citizen-centered, results-oriented, market-driven Lines of Business of OMB's Business Reference Model. Each Mission Goal is a component of one or more of the OMB identified services provided to and on behalf of the American Citizen. NOAA's Line and Staff Offices execute activities required to achieve these goals through NOAA programs. These programs may involve the activities of more than one Line or Staff Office.

- **Ecosystems:** Protect, Restore, and Manage the Use of Coastal and Ocean Resources Through an Ecosystem Approach to Management **(Natural Resources, Disaster Management, Law Enforcement)**
- **Climate:** Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond **(General Science and Innovation)**

- **Weather and Water:** Serve Society's Needs for Weather and Water Information **(Environmental Management)**
- **Commerce and Transportation:** Support the Nation's Commerce with Information for Safe, Efficient, and Environmentally Sound Transportation **(Economic Development, Transportation)**
- Mission Support: Provide Critical Support for NOAA's Mission **(Administrative Management, Financial Management, Human Resources Management, Information and Technology Management)**

Development of the Target Enterprise Architecture

Several key documents central to the PPBES process describe the development and identification of NOAA's Target Enterprise Architecture. These include the NOAA Strategic Plan, the Annual Guidance Memorandum, the Program Baseline Assessment, the Program Plans, the Strategic IT Plan, and the Program Decision Memorandum. The major future directions of the FY07-011 Annual Guidance Memorandum that provide a programmatic basis for the Target EA include:

1. Integrate Global Observations
2. Increase Climate Information, Services and Products
3. Provide Critical Information for Water Resources
4. Provide Leadership for the Oceans
5. Support the US Transportation Systems
6. Advance NOAA's Modeling Capability
7. Improve Critical Infrastructure and Services
8. Enhance Environmental Literacy
9. Deliver Effective, Efficient Decision Support Information
10. Enhance the Skills and Capabilities of NOAA's Workforce
11. Improve Administrative Programs
12. Maintain and Provide Necessary Platforms

Further the NOAA CIO through the CIO Council is advancing key technological drivers such as One-NOAA functionality and operations, leveraging multi-agency investments, replacing proprietary legacy with open standards, automating manual processes, data reuse, interoperability, and responding to Critical Infrastructure Protection (CIP)and Continuity of Operations (COOP) requirements. NOAA is committed to pursuing these architectural imperatives, specifically:

1. Migrate to a One NOAA Enterprise Networking
2. Provide National Capabilities
3. Integrate Systems
4. Improve Critical Infrastructure
5. Advance use of Technology
6. Integrated Data Management
7. Employ a Strategic and Enterprise Wide IT Perspective

8. Use Common Interfaces Across all Capabilities
9. Employ COTS Components
10. Leverage Technology Platforms

NOAA Information Technology Architecture

Figure 5 shows the NOAA Information Technology Architecture. The diagram illustrates the relationship between NOAA's environmental observing and data collection functions and the required architectural IT components such as networks, storage, applications, data handling, visualization and archiving. The IT components needed to achieve NOAA's mission are addressed in the Target Architecture investments.

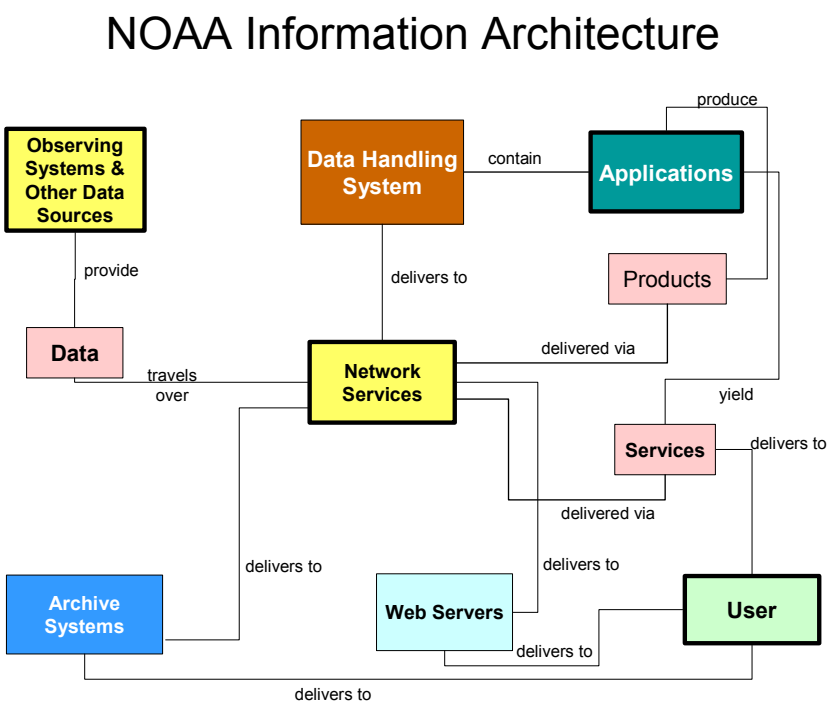

Figure 5 NOAA Information Architecture Flow

A description of NOAA's primary Target Architecture investments is provided in the following sections. These investments achieve the goals, guidance, imperatives, and programs identified in the PPBES process.

High Performance Computing (HPC)

Mission Goal: Weather and Water

NOAA's High Performance Computing (HPC) capabilities provide the computational resources necessary to support continued advances in the environmental modeling capabilities. HPC investments are intended to meet other HPC requirements that may arise within NOAA and at other partner agencies during the next eight years. IT capital investment includes the HPC systems, complementary storage devices and interconnects, communications hardware interfaces, software, networking equipment, system maintenance, support services, and necessary infrastructure enhancements. This represents a coordinated and centralized capital planning effort for the three NOAA HPC organizations, and is intended to improve the acquisition process between the Government and contractor community, and to achieve economies of scale through consolidation of system requirements and a reduced number of individual acquisitions.

The NOAA R&D HPCS resources will:

- Facilitate applied meteorological research and development for purposes of improving and creating short-term warning and weather forecast systems, models, and observing technology.
- Enable scientists to attack long-lead-time problems associated with the physical processes that govern the behavior of the atmosphere and the ocean.
- Provide resources for data analysis, visualization, networking, and telecommunications.
- Provide resources for one of two national climate modeling facilities in order to coordinate and accelerate climate Modeling and Simulation (M&S) activities and provide relevant decision support information on a timely basis as part of the multi-agency Climate Change Science Program (CCSP).
- Provide systems that are utilized for a number of meteorological research projects, including the development of next generation weather and climate forecast models, National Test Bed, and Satellite Data Assimilation projects.

Figure 6 portrays the Baseline to Target Architecture of NOAA's High Performance Computing program.

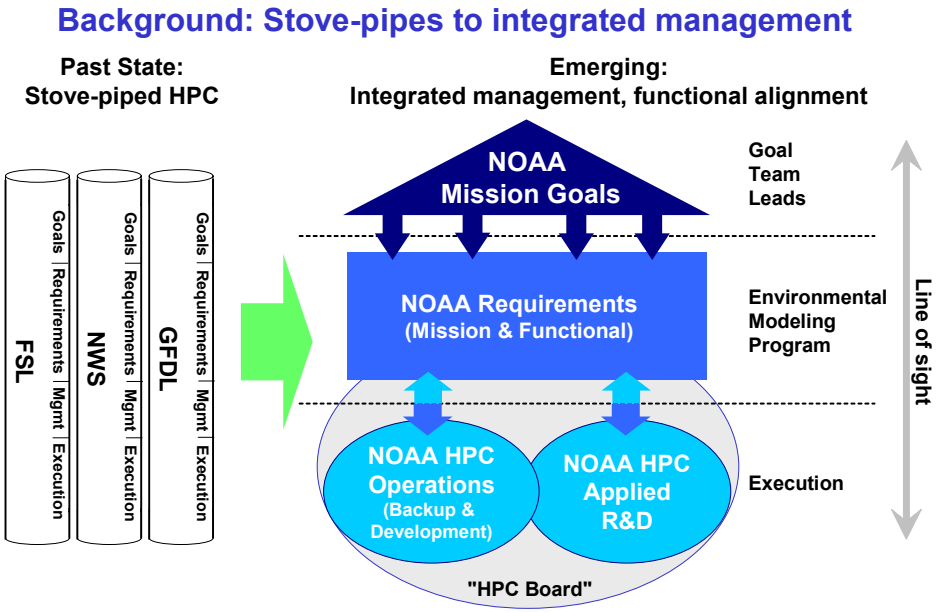

Figure 6 High Performance Computing Target Architecture

Comprehensive Large Array Data Stewardship System (CLASS)

Mission Goal: Climate

The purpose of the CLASS Program, including the Earth Observing System (EOS) component, is to enhance NOAA's capability to serve society's need for weather and water information as well as understand climate variability and change to enhance society's ability to plan and respond through the effective application of modern, proven techniques and technology. The CLASS project will afford efficient management of high volumes (petabytes) of data critical to the United States Global Change Research Program and scientific community.

Specific Target attributes include:

- Efficient management of high volumes (petabytes) of observing data
- Automating data ingest, archive, quality control, and access
- Integrated solution for Data archive and access across all Data Centers
- Integrated Data Portal

Figure 7 shows the CLASS Target Architecture.

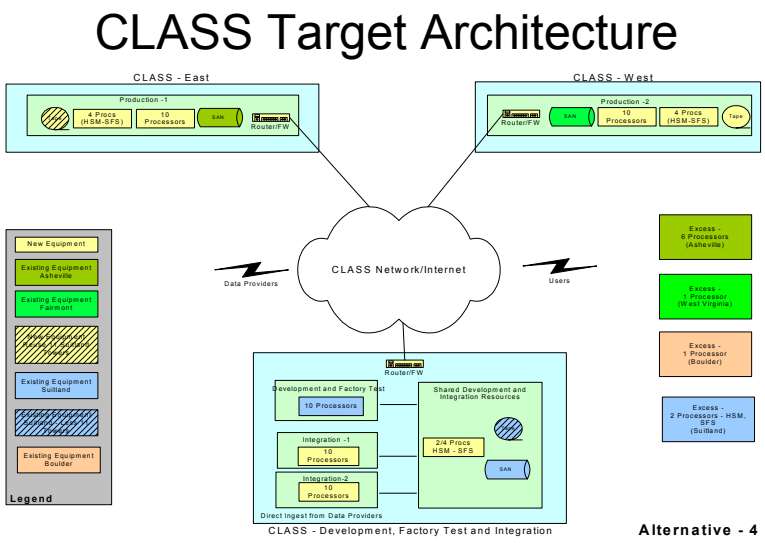

Figure 7 CLASS Target Architecture

National Polar Orbiting Operational Environmental Satellite System (NPOESS)

Mission Goal: Weather and Water

The National Polar-orbiting Operational Environmental Satellite System (NPOESS) will merge existing polar-orbiting satellite systems under a single national program to a three orbit system. In addition to cost-effectiveness the National Polar-orbiting Operational Satellite System (NPOESS) increases the timeliness and accuracy of severe weather event forecasts. Figure 8 depicts the Target Architecture for NPOESS

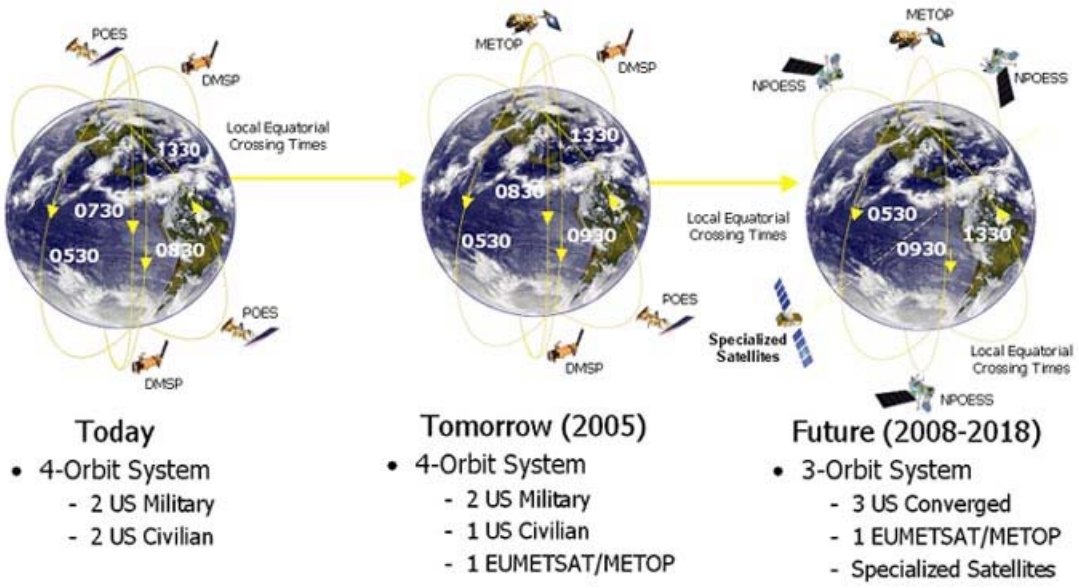

Figure 8 National Polar Orbiting Environmental Satellite System (NPOESS)

Advanced Weather Interactive Processing Systems (AWIPS)

Mission Goal: Weather and Water

The Advanced Weather Interactive Processing System (AWIPS) is the cornerstone of a modernized NWS. The system integrates and displays all hydrometeorological data at NWS field offices. Specific Target attributes include:

- Upgraded hardware, software and telecommunications
- Hardware: Linux workstations
- Software: Improvements to display functionality
- Communications: Satellite and LAN bandwidth increases

The figures below depict the Target Architecture for Communications and Network for AWIPS

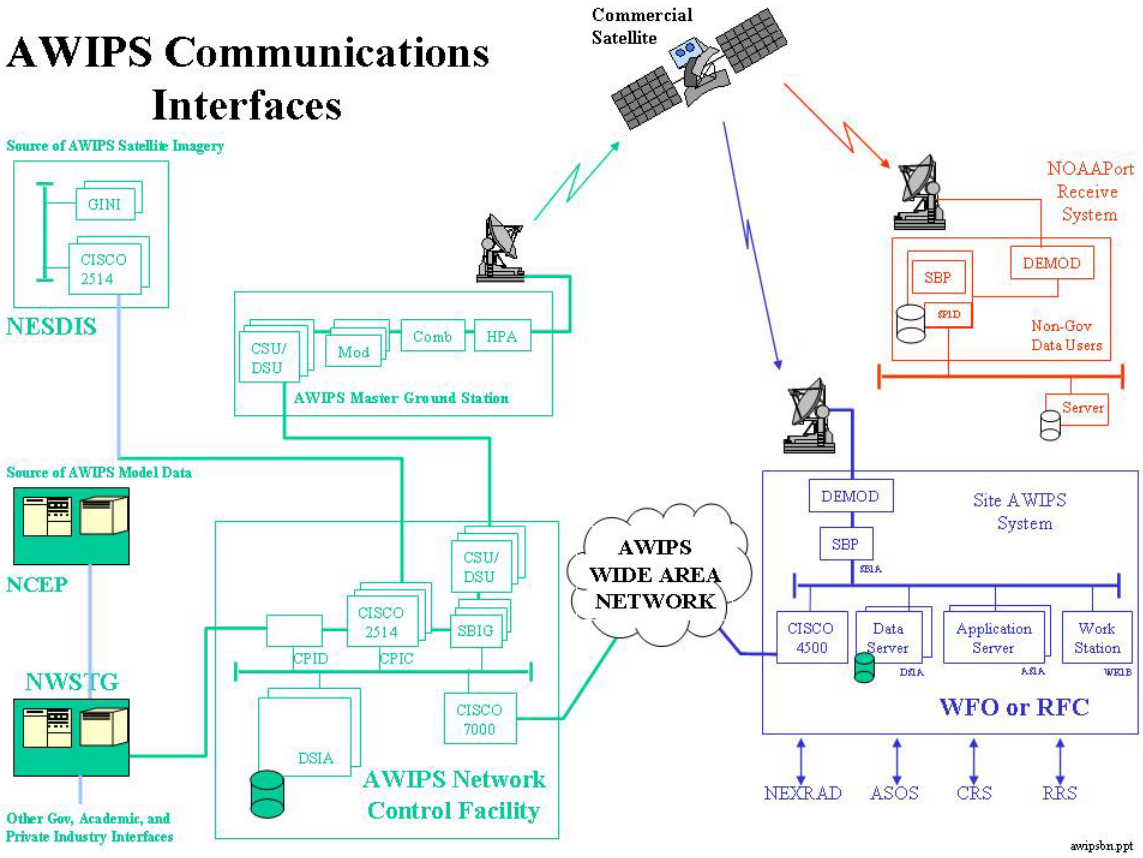

Figure 9 AWIPS Communications Interfaces

Figure 10 shows the AWIPS Target Architecture.

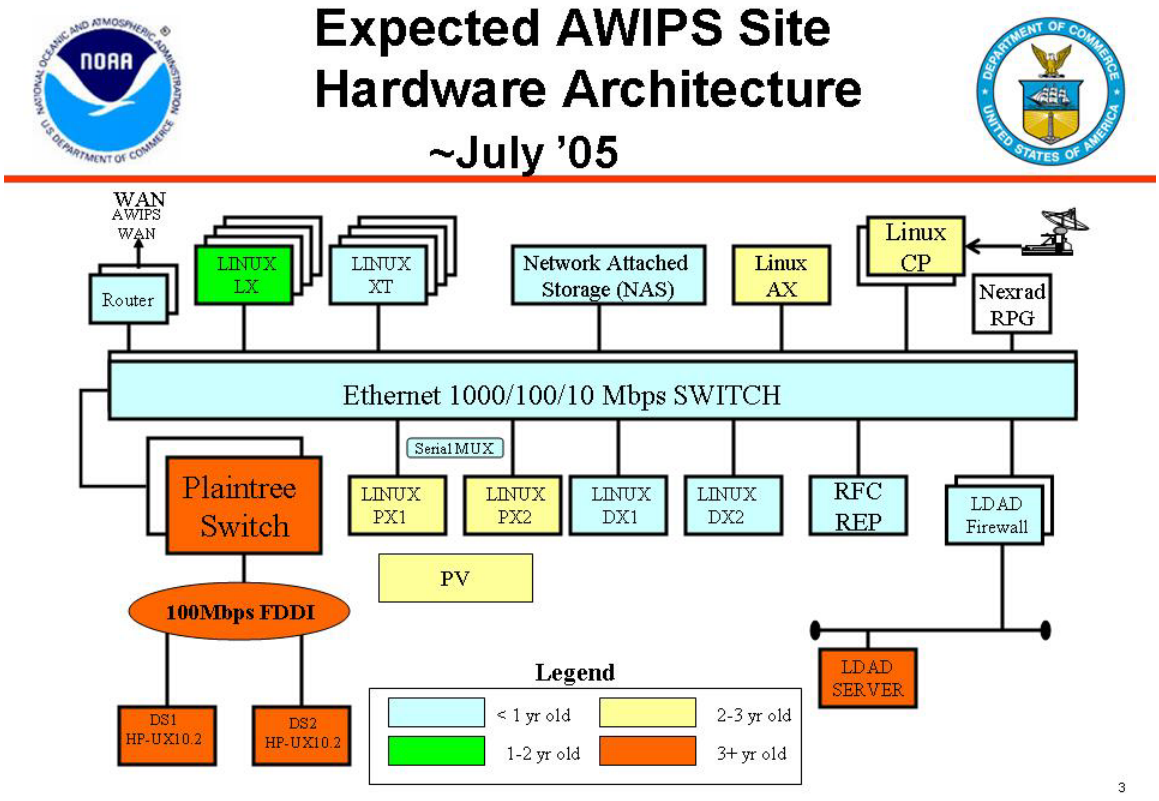

Figure 9 AWIPS Target Architecture

NWS Telecommunications Gateway (NWSTG)

Mission Goal: Weather and Water

The NWSTG System Program consolidates three interrelated and sequential projects:

1. Current legacy operations at SSMC2 Silver Spring, MD;
2. NWSTG Legacy Replacement at SSMC2 Silver Spring, MD;
3. Critical Infrastructure Protection (CIP) backup NWSTG.

This investment will provide the NWSTG sufficient performance and capacity to meet current and future demands for high volume data throughput and zero latency message transit times.

The figure below identifies the NWS TG Target Architecture (TBD)

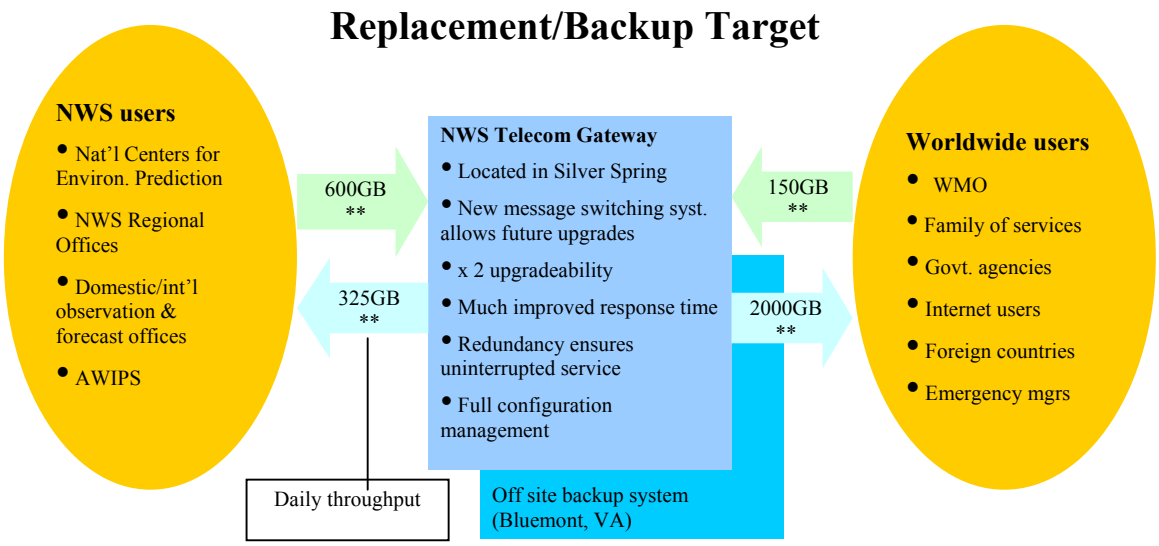

Figure 10 NWS Target Architecture

NWS Volunteer Cooperative Observing System Modernization (NWS COOP-M)

Mission Goal: Weather and Water

This investment will modernize sensors and upgrade telecommunications. Specific Target attributes include:

- 20 X 20 mile gird across the US
- All modern sensors
- Five minute readings
- One hour data transmission frequency.

All Hazards Radio

Mission Goal: Weather and Water

The purpose of this investment is to automate the collection and dissemination of non-weather civil-emergency messages over NOAA Weather Radio (NWR) and to quickly and securely authenticate messages received by emergency managers. Federal, State, and local Emergency Managers require an automated, secure, and authenticated means to post hazard information on the all-hazards network.

Specific Target attributes include:

- Automatic ingest of messages
- Earthquake, chemical spill, fire, amber alert…messages
- Develop HAZCollect System
- Link AWIPS to FEMA Disaster Management Interoperability Services System (DMIS).

Radiosonde Replacement System

Mission Goal: Weather and Water

Radiosondes are the primary data source for the initialization of NWS numerical weather prediction models used to support severe storm, aviation and marine forecasts. In addition, they provide input for pollution/dispersion models, climatology records and studies, and general research.

Specific Target attributes include:

- GPS based signal processing and equipment
- Surface observing instrument system
- Telemetry receiver system
- Modern workstations.

NOAA Enterprise Network

Mission Goal: Critical Mission Support

The NOAA Enterprise Target Architecture implementation will move NOAA from a collection of twelve legacy networks to a single coherent Enterprise Architecture that reduces Total Cost of Ownership by over 20 percent. Specific Target attributes include:

- Single Coherent Architecture
- Rationalized at the Enterprise Level
- Connects major sites and functions at single logical points
- Leverages Metropolitan networks
- Integrated Security
- Built-in Redundancy

Figure 12 below depicts the conceptual Target Architecture for the NOAA Enterprise Network.

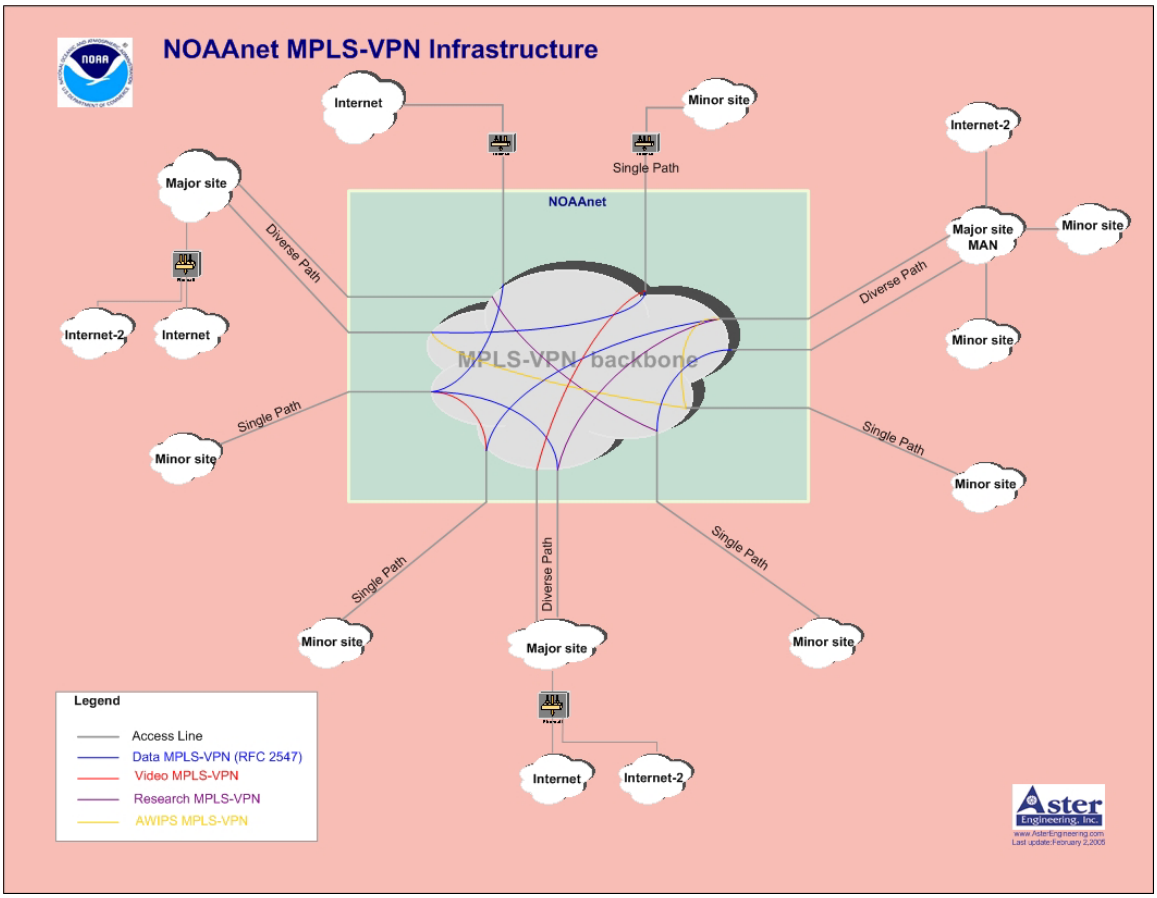

Figure 11 Conceptual Target Architecture for the NOAA Enterprise Network

Grants Online

Mission Goal: Critical Mission Support

NOAA awards over $800 millions in grants annually. The NOAA Grants Online Project will provide a fast, coherent, flexible and robust application in support of the evaluation, award and long-term management and operations processes. Specifically the project will deliver a standardized set of capabilities for viewing, retrieving, modifying, and deleting Application and Grant related information including, but not limited to: applications, awards, amendments, audits, proposal scoring and commentary, budget and finance data, as well as Technical and Panel Peer Review information. The Grants Online Project Team is working in conjunction with and support of the President's E-Grants Initiative and ensures that grant application information keyed into the Grants.gov system can be imported into the Grants Online system for use by the all affected NOAA components
.
Figures 13 and 14 depicts the Baseline and Target Architectures for Grants Online

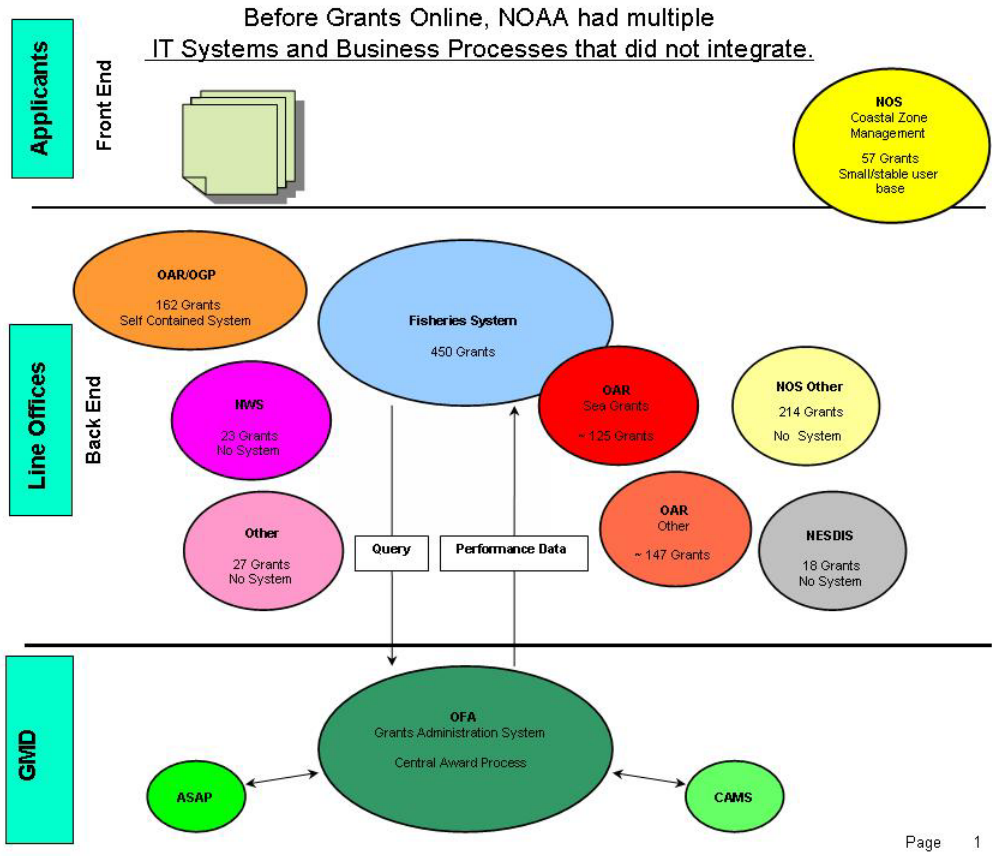

Figure 12 Grants Online Baseline Architecture

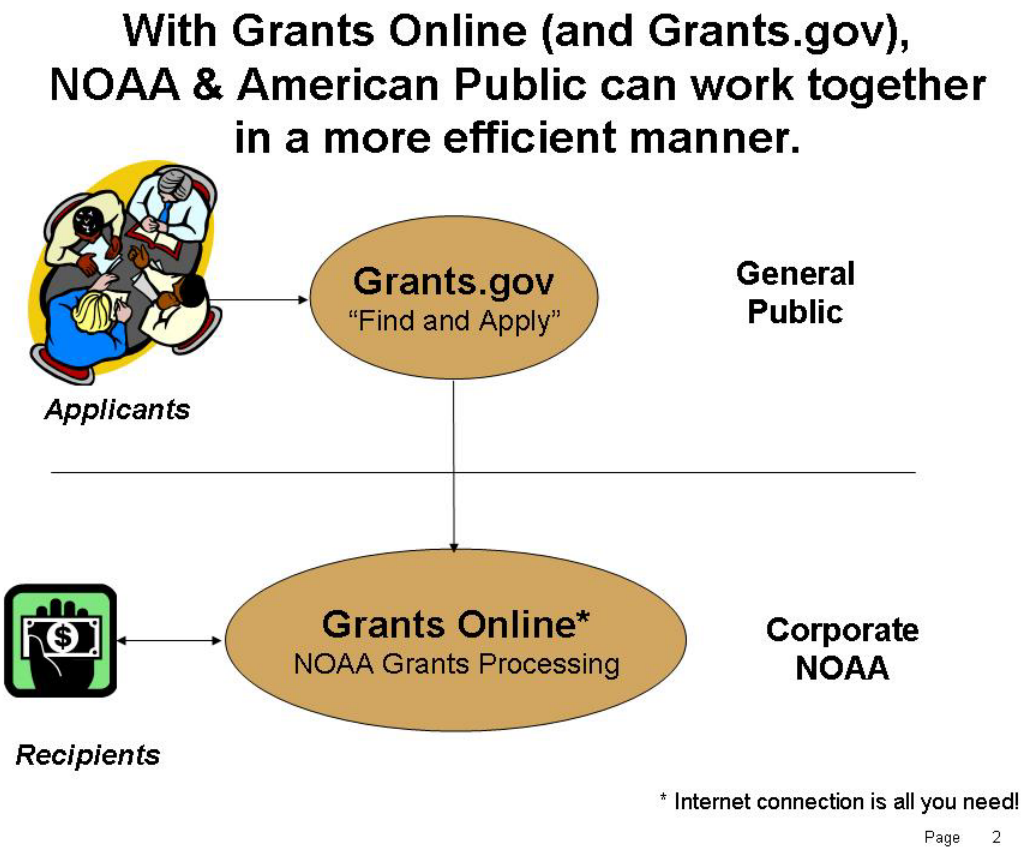

Figure 13 Grants Online Target Architectures

Email Server Consolidation

Mission Goal: Critical Mission Support

NOAA has a well established e-mail Enterprise Architecture including a hierarchical server infrastructure that reflects the current network architecture. The messaging architecture includes enterprise calendar, e-mail, and directory services. All rely on single open standards based software standards for both server and client software. The Messaging Operations Center (MOC) operated by the Office of the CIO manages and coordinates all central servers and services including:

- LDAP directory which supports authentication and directory services
- Single calendar server
- Single logical interface to outside email though which incoming messages are filtered for viruses and Spam.

All policy and standards are coordinated through the Enterprise Messaging Committee (EMC) and are documented on the OCIO website.

As NOAA moves to an integrated enterprise network architecture (see above), selection criteria, a business plan, and a migration plan to support a far more centralized server architecture which will reduce the number of mail servers from 73 (including servers on ships) to a minimum number of strategic, robust servers that will provide continuity of operations and fail over services for this mission critical function.

End to End Resource System (E2E)

The End to End Resource Management System (E2E) will provide integrated automated support for the PPBES. The PPBES organizes the complex interrelationships among the mission goals, programs, organizations, budgets, fiscal years, and performance measures. The E2E will rationalize the current system of text spreadsheets, and databases – minor and major – into a single system of systems. The E2E will utilize modules reflecting the four PPBES phases and include interfaces to the Department of Commerce's Commerce Business system and Consolidated Reporting System.

The FY07-FY11 PPBES process has identified the following potential Target investments. These are currently under review by the NOAA Information Technology Review Board.

- Integrated Ocean Observing System (IOOS)
- Data Management and Communications (DMAC)
- Water Quality
- Surface Weather
- NOAA Profiler Network
- Unmanned Aerial Vehicles
- Global Earth Observing System of Systems (GEOSS)
- Tsunami Warning System.

NOAA's Target Architecture will be continuously updated as requirements evolve.